

Development of a Digital Competence Framework for Higher Education Teachers

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Abstract: The development of digital literacy is of vital importance to higher education teachers in the face of the challenges of increasing digitization of higher education and society. This paper first addresses the notion of digital literacy in general and the specific context of higher education teachers. Furthermore, the development of a competence framework is documented with which the digital competence of university lecturers can be systematically recorded. In addition, higher education and media didactic further education courses can be aligned to this framework in order to specifically promote the development of digital competence of teachers.

1. Introduction

In the modern knowledge society, digital technologies are constantly gaining in importance and are now penetrating them almost completely, both at work and in the private sector. Social participation is also becoming increasingly important via digital media. The European Union takes this development into account by considering the competent and reflected use of digital technologies as one of the eight key competences for Life Long Learning (EU 2006). In this context, the question of the development of competences to master the challenges of digitalisation arises for the professions of professors.

2. What is Digital Competence?

In the German-speaking world in particular, the term media competence has often been used in the past, which goes back to the work of Dieter Baacke (1973, 1996). According to this, media literacy is a special form of communicative competence (see Habermas, 1981) or the ability to use all kinds of media actively for their own repertoire of communication and action. Baacke's concept of media, however, was aimed primarily at classical mass media rather than at interactive digital media, so more recent concepts are more likely to use the term digital competence (Ilomäki et al., 2011), which is becoming increasingly prevalent. A broad definition of the term can be found at Ferrari (2012, pp. 3ff.):

"Digital Competence is the set of knowledge, skills, attitudes [...] that are required when using ICT and digital media to perform tasks, solve problems, communicate, manage information, collaborate, create and share content, and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socializing, consuming, and empowerment."

This definition, which applies the competence concept of Weinert (2001) and Klieme (2004) to the digital field, serves as the basis for the development of the competence framework presented here.

2. Structure of the Competence Framework

In order to assess the individual abilities of university lecturers in dealing with digital media, a model fulfilling two conditions is needed. On the one hand, it has to be comprehensive

enough to cover the different facets of digital literacy. On the other hand, the model should also look at the profile of professors in their entirety. University lecturers are not only teachers but also scientists who are also in constant contact with the scientific community and society (see Reinmann et al., 2013 and Wedekind, 2004, 2008, 2009).

For the development of the competence grid various international competence models for the description of digital competencies were investigated, among others the framework model *TPCK (Technological Pedagogical Content Knowledge)* by Koehler and Mishra (2006), the *digi.kompP* model, which is used in Austrian teacher training (Brandhofer et al., 2016), as well as the *DIGCOMP* framework of the European Commission (see eg Ferrari et al., 2013; Vuorikari et al., 2016; Gomez et al., 2017).

However, the most important inspiration was the Norwegian model "Digital *Bildung*" (Søby, 2003; Krumsvik and Jones, 2013), and in particular the Digital Literacy Framework of the British Joint Information System Committee JISC (2012, 2014).

3.1 Description of the Competence Framework

Analogous to the Ferrari definition of digital competences, the competence framework comprises a total of eight dimensions:

- *ICT competence*: Adopt, adapt and use digital devices, applications and services
- *Teaching skills*: Teach and support informal study and learn effectively in technology-rich environments
- *Digital scholarship*: Participate in emerging academic, professional and research practices that depend on digital systems
- *Information literacy*: Find, interpret, evaluate, manage and share information
- *Media literacy*: critically read academic and professional communications in a range of media
- *Media production*: creatively produce digital media for teaching, learning and research
- *Communication and collaboration*: Participate in digital networks for learning and research
- *Career and identity management*: Manage digital reputation and online identity

Although these dimensions of competence can be described independently of a specialized academic discipline, they must be individually trained within a discipline (see Kerres, 2017). In order to be able to record the current state of digital competence as well as a possible increase in competence for the individual dimensions, three levels of competence were introduced in the model. These are based on the learning taxonomy according to Bloom (1976) and Anderson et. al (2001) as well as on the above-mentioned model of "Digital *Bildung*" and are subdivided as follows:

- *Level 1*: Basic digital skills
- *Level 2*: Practical usage (in academic and professional practices)
- *Level 3*: Knowledge transfer and instruction of others (students and colleagues)

A graphic representation of the resulting competence framework is shown in Figure 1.

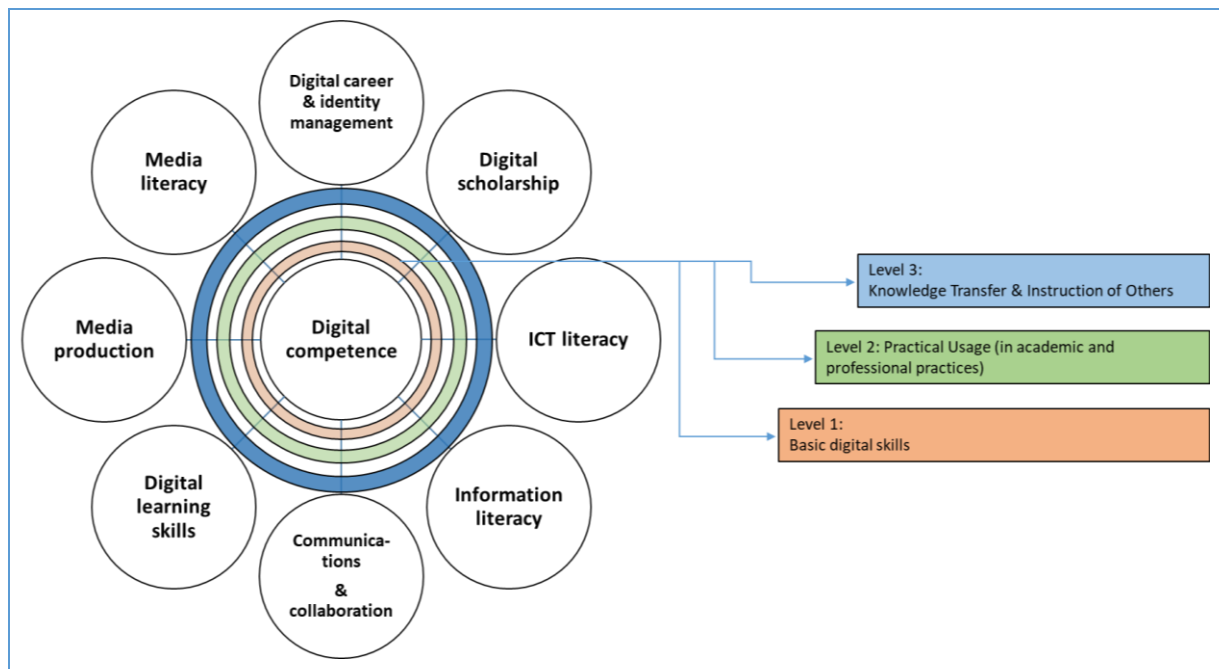


Figure 1. Digital Competence Framework: Schematic representation (From: Eichhorn et al. 2017, p. 214).

For each of the eight dimensions, it was now necessary to define the individual subject areas, which are covered by the respective dimension. In some cases, descriptions from the JISC model were used, which were then concretely specified and expanded. This resulted in the following topics on the individual dimensions (see Table 1):

Table 1: Distribution of the topics on the individual dimensions of the competence framework (1).

Dimension	Topic
ICT competence	PC skills, ICT skills, cloud computing, programming, work organization, learning platform management and authoring systems
Information literacy	Search instruments, search strategies, reference management, knowledge management, copyright, data protection
Communication and collaboration	Online Communities, Web 2.0, Social Media, Open Source, Open Access, Tutoring on Learning Platforms, eTutoring, eModeration
Teaching skills	Terms (eLearning, blended learning, distance learning), learning theories, didactic design, OER, eAssesment, badges, social media
Career and identity management	Social media, self-marketing, badges as proof of competence, data protection, personal protection, knowledge management
Digital scholarship	Open Access, Open Data, Big Data, Crowd Science, Digital Humanities, Digital Knowledge Communication, Communities of Practice
Media production	Image editing, screencasting, podcasting, video production, creating interactive content such as WBTs, etc.
Media literacy	Media analysis, media criticism, reflection on their own use of media, reflection on their own use of media and their own teaching activities, reflection on their own learning process

3.2 Design of the Framework with Can-Do Descriptions

Based on the outlined topics, which should be covered in the respective dimensions, the framework was designed accordingly. To this end, can-do descriptions of the three competence levels were created for each dimension to obtain a description of the content of digital literacy. For the formulation of the can-do descriptions, various lists of key verbs for competence formulation were used, which describe directly observable actions (inter alia Roloff, 2003 and Schermutzki, 2007). In Table 2, the structure of the competence framework will be exemplified by the dimension *Teaching skills* (2):

Table 2: Distribution of the topics on the individual dimensions of the competence framework.

Competence dimension <i>Teaching skills</i>	
<i>Level 1:</i> Basic digital skills	He / she can play basic learning theories and name the main terms and acronyms around e-learning and digitization, as well as explain their meaning. He / she can describe different eLearning scenarios and identify their added value. He / she can describe relevant methods of online teaching and learning. He / she can assign suitable media for a planned scenario and describe their characteristics and potential in support of methods and social forms. He / she can designate important planning aspects for the conception of eLearning scenarios.
<i>Level 2:</i> Practical usage (in academic and professional practices)	He / she can design and implement concepts for the use of online or blended learning scenarios as well as for the use of online-based assessment forms. For this he / she can transfer the existing knowledge about eLearning scenarios and their added values into practice. He / she can select and apply appropriate methods, social forms and media. In doing so, he / she can consider the required planning aspects.
<i>Level 3:</i> Knowledge transfer and instruction of others (students and colleagues)	He / she is able to explain and communicate basic concepts around eLearning and digitization of teaching. He / she can explain and explain the knowledge of scenarios and added values, the methods and social forms derived from them as well as the adequate use of suitable media. With the help of this knowledge, he / she is able to guide, advise and support others in the planning and design of media-supported teaching / learning settings.

This exemplary presentation clarifies the structure and functioning of the competence framework. With the help of the optional descriptions, the topic fields of the individual dimensions are operationalized, so that questionnaires for the self-assessment by the university teachers can be easily created. Due to the focus on observational actions the evaluation can also be done by a trainer or a teacher.

4. First results from practical use

For practical use, a self-assessment questionnaire was created from the descriptions. Each dimension and level was described with at least 3 items. The assessment was made on a scale of 6 ("1 = strongly disagree" to "6 = completely agree"). The self-assessment was conducted in the summer semester 2017 with teachers (N = 56) who had participated in eLearning qualification offers. As a result, teachers who had acquired a didactic eLearning certificate were much better off than teachers who attended only selected individual events. Deficits are recognized by the involved teachers, especially in the dimensions *digital scholarship* and *career and identity management*. Both aspects play only a minor role in the current eLearning qualification offer (see Figure 2).

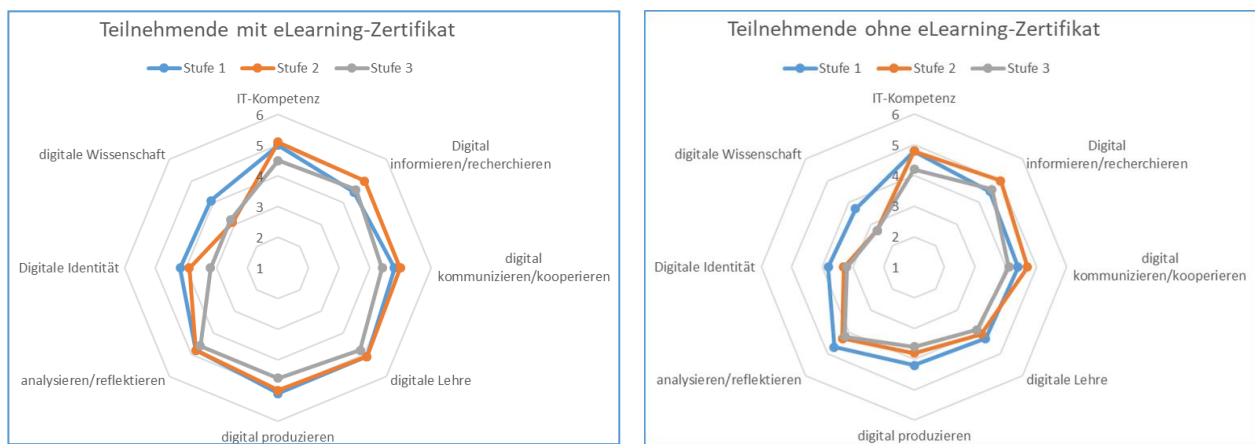


Figure 2. Evaluation of the self-assessment of the digital competence on the individual dimensions. Comparison of the participants with or without eLearning certificate.

5. Conclusion and Outlook

The competence framework is currently work-in-progress and is constantly being revised. Through interviews with selected participants, the completeness and comprehensibility of the items is currently being determined.

From the winter semester 2017/18, the competence framework will also be used as part of a pre- and post-survey of all participants of the eLearning certificate in order to determine the increase in competence. The goal here is both the use as an individual diagnostic tool, as well as a statement about which competence dimensions in a particular training offer to which extent be strengthened.

Endnotes

- (1) Of course, the list of topics does not claim to be exhaustive, but rather serves to concretize the dimensions for the first time.
- (2) For reasons of space, a description of the can-do descriptions for all eight dimensions is omitted here. The complete competence framework with all can-do descriptions is available online at: http://www.studiumdigitale.uni-frankfurt.de/65903024/Kompetenzraster_Digitale-Kompetenz-Hochschullehrende.pdf

References

- Anderson, Lorin W., et al. A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives., Longman Publishing Group, 2001.
- Baacke, Dieter. Kommunikation und Kompetenz: Grundlegung einer Didaktik der Kommunikation und ihrer Medien. 1973.
- . "Medienkompetenz - Begrifflichkeit und sozialer Wandel." Medienkompetenz als Schlüsselbegriff, edited by Antje von Rein, Deutsches Institut für Erwachsenenbildung, 1996, pp. 112–44. www.die-frankfurt.de/esprid/dokumente/doc-1996/rein96_01.pdf. Accessed 23 March 2017.
- Bloom, Benjamin Samuel, and Max D. Engelhart, editors. Taxonomie von Lernzielen im kognitiven Bereich. 5. Aufl. - 17. - 21. Tsd, Beltz, 1976. Beltz-Studienbuch 35.
- Brandhofer, Gerhard, et al. "digi.kompP - Digitale Kompetenzen für Lehrende: Das digikompP-Modell im internationalen Vergleich und in der Praxis der österreichischen Pädagoginnen-

- und Pädagogenausbildung.” R&E-Source, Oktober 2016, 2016, pp. 38–51. journal.ph-noe.ac.at/.
- Eichhorn, Michael, et al. “Entwicklung eines Kompetenzrasters zur Erfassung der „Digitalen Kompetenz“ von Hochschullehrenden.” *Bildungsräume: Proceedings der 25. Jahrestagung der Gesellschaft für Medien in der Wissenschaft* : 5. bis 8. Sep. 2017 in Chemnitz, edited by Christoph Igel, Waxmann, 2017, pp. 209–19. www.waxmann.com/?eID=texte&pdf=3720Volltext.pdf&typ=zusatztext. Accessed 18 Sep. 2017.
- Europäische Union (EU). Schlüsselkompetenzen für lebenslanges Lernen: Empfehlung 2006/962/EG des Europäischen Parlaments und des Rates vom 18. Dezember 2006 zu Schlüsselkompetenzen für lebensbegleitendes Lernen. 2006. Accessed 23 March 2017. eur-lex.europa.eu/legal-content/DE/TXT/?uri=uriserv:c11090.
- Ferrari, Anusca. *Digital Competence in Practice: An Analysis of Frameworks*. European Commission, 2012. Accessed 20 Feb. 2017. ftp.jrc.es/EURdoc/JRC68116.pdf.
- Ferrari, Anusca, et al. *DIGCOMP: A framework for developing and understanding digital competence in Europe*, Publications Office, 2013. EUR, Scientific and technical research series 26035.
- Gomez, Stephanie Carretero, et al. *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use*, Publications Office, 2017. EUR, Scientific and technical research series. Accessed 29 May 2017.
- Habermas, Jürgen. *Theorie des kommunikativen Handelns*, Suhrkamp, 1981.
- Ilomäki, Liisa, et al. *What is digital competence?* 2011, tuhat.helsinki.fi/portal/files/48681684/Ilom_ki_etal_2011_What_is_digital_competence.pdf. Accessed 20 Feb. 2017.
- JISC. *Developing Digital Literacies: Briefing Paper*. 2012, www.jisc.ac.uk/media/documents/publications/briefingpaper/2012/Developing_Digital_Literacies.pdf. Accessed 13 Oct. 2016.
- . *Developing Digital Literacies: Overview*. 2014, www.jisc.ac.uk/guides/developing-digital-literacies. Accessed 13 Oct. 2016.
- Kerres, Michael. “[preprint] Digitalisierung als Herausforderung für die Medienpädagogik: „Bildung in einer digital geprägten Welt“.” *Pädagogischer Mehrwert? Digitale Medien in Schule und Unterricht*, edited by Christian Fischer, 1. Auflage, vol. 133, Waxmann Verlag GmbH; Ciando, 2017, pp. 85–104. mediendidaktik.uni-due.de/sites/default/files/kerres4m%C3%BCnster_0.pdf. Accessed 18 May 2017.
- Klieme, Eckhard. “Was sind Kompetenzen und wie lassen sie sich messen?” *Pädagogik (Weinheim)*, vol. 56, no. 6, 2004, pp. 10–13.
- Koehler, Matthew, and Punya Mishra. “Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge.” *Teachers College Record*, vol. 8, no. 108, 2006, pp. 1017–54.
- Krumsvik, Rune Johan, and Lise Oen Jones. *Teachers’ Digital Competence in Upper Secondary School*. (Work in Progress), *ICICTE Proceedings*. 2013, www.icicte.org/Proceedings2013/Papers%202013/05-1-Krumsvik.pdf. Accessed 24 March 2017.
- Reinmann, Gabi, et al. *Akademische Medienkompetenz im Schnittfeld von Lehren, Lernen, Forschen und Verwalten*. 2013, gabi-reinmann.de/wp-content/uploads/2013/07/AkademischeMedienkompetenz_Reinmann_Hartung_Florian.pdf. Accessed 13 Oct. 2016.
- Søby, M. *Digital Competence: from ICT skills to digital „Bildung.“* ITU, 2003.
- Vuorikari, Riina, et al. *DigComp 2.0: The digital competence framework for citizens*, Publications Office of the European Union, 2016. EUR, Scientific and technical research series 27948.
- Wedekind, Joachim. “Medienkompetenz an Hochschulen.” *E-Learning-Strategien und E-Learning-Kompetenzen an Hochschulen*, edited by Claudia Bremer and Kerstin Kohl, Bertelsmann, 2004, pp. 267–79.
- . “Medienkompetenz für (Hochschul-)Lehrende.” *zeitschrift für e-learning*, vol. 3, no. 2, 2008, pp. 24–37.
- . *Akademische Medienkompetenz. Schriftfassung der Virtuellen Ringvorlesung e-teaching.org vom 19.01.2009*, 2009, www.e-teaching.org/projekt/organisation/personalentwicklung/medienkompetenz/Medienkompetenz_JW.pdf. Accessed 22 March 2017.

Weinert, Franz E., editor. Leistungsmessungen in Schulen. Dr. nach Typoskript, Beltz, 2001.